

Assessment of the Effectiveness of an Adult Audiologic Rehabilitation Program Using a Knowledge-Based Test and a Measure of Hearing Aid Satisfaction

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Responses on a 35-item Audiologic Rehabilitation Test (ART) were compared between 23 individuals who had attended a 5-week group Hearing Aid Orientation Program (HOP) and 23 individuals who had purchased hearing aids, but who had not had any group intervention. The mean score for the ART was significantly higher for the HOP group compared to the Non-HOP group. There was no significant difference between groups in terms of satisfaction with their hearing aids as measured by the Satisfaction with Amplification in Daily Life (SADL) questionnaire (Cox & Alexander, 1999). Participating in a group hearing aid orientation program appears to provide participants with a broad knowledge base that can serve to enhance their communicative effectiveness. Clinical implications are discussed.

Providing adult audiological rehabilitation support programs, especially for new hearing aid wearers, is increasing among audiologists (Spitzer, 2000). Assessing the effectiveness of group programs is important and has attracted much recent interest (Bentler & Kramer, 2000; Gagné, McDuff, & Getty, 1999; Gatehouse, 2000; Johnson & Danhauer, 2002; Kricos & Lesner, 2000; Northern, 2000; Spitzer, 2000; Stephens, Jones, & Gianopoulos, 2000). The reasons for the interest are many and include the need for quality assurance and to insure that intervention is both beneficial and cost-effective. Kricos and Lesner (2000) have

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discussed several potential outcome measures including the use of attendance patterns; observations by staff; handicap inventories; measures of hearing aid benefit, use, and satisfaction; patient satisfaction surveys; and communication performance. While each of these measurement approaches offers certain advantages and disadvantages, the choice of outcome measure must be made based upon the goals of the intervention (Gagné et. al, 1999).

Hearing Aid Orientation Programs (HOP) vary greatly in terms of their focus, content, and length (Abrahamson, 1995). In general, audiologic rehabilitation groups tend to be either instructional or interactive. All patients who obtain hearing aids from The Audiology and Speech Center at The University of Akron are strongly encouraged to participate in the HOP. Not all patients choose to participate while some individuals who obtain hearing aids from other sources do. The purpose of the HOP sessions include both instructional and interactional components with the goals being to facilitate adjustment to the use of amplification, to foster realistic expectations for hearing aid use, to maximize communication performance, to provide emotional support, and to solve any particular problems experienced as a result of having a hearing impairment (Lesner, 1995). Considering that a major emphasis of the HOP is to provide individuals with information about hearing, hearing loss, hearing aids, assistive devices, and strategies to maximize communication, it would seem logical that a knowledge-based test would be an ideal mechanism for assessing the effectiveness of instruction. There is, however, scant research available concerning the use of objective tests as outcome measures in audiologic rehabilitation.

It is nearly impossible to provide hearing aid wearers with all of the necessary information during a typical hearing aid fitting session. In fact, Eggen and Stanford (1988) found that a mean of 30 min was allotted to hearing aid orientations. Furthermore, significant amounts of information need to be given to patients when orienting them to hearing aids. Tirone and Stanford (1992) found that a range of 61-135 "information bits" were presented to new hearing aid wearers during hearing aid orientations with as many as five information bits being presented in less than 1 min. An information bit was defined as any new information or a demonstration of a new technique. Considering that hearing aid patients may be under stress during clinic visits and that older adults learn information best when they are provided with repeated practice while under low stress, the typical single session hearing aid orientation is not the ideal method for transmitting information. For that matter, individuals with hearing impairments need to know much more than just information about hearing aids if they are to maximize their communication, including information about assistive devices and communication strategies.

Group hearing aid orientation programs offer an ideal way to provide the necessary information in a time and cost effective manner. Results from a variety of researchers using a variety of measures report that individuals who receive organized post-fitting hearing aid orientations are more likely to wear and use their

hearing aids compared to those who do not participate in adult audiologic rehabilitation programs (Brooks, 1979, 1989; Kapteyn, 1977; Surr, Schuchman, & Montgomery, 1978; Ward, 1981; Ward & Gowers, 1980; Weinstein, 1996).

Use of amplification does not, however, equate with satisfaction since it is possible to use a hearing aid yet not be satisfied with the performance and/or other factors related to the dispensing of the hearing aid (Dillon, James, & Ginis, 1997; Hosford-Dunn & Halpern, 2000; Humes, 1999; Kochkin, 1993, 2000). Satisfaction is a construct that should be measured independently (Hosford-Dunn & Halpern, 2000). In fact, Cox and Alexander (1999) have suggested that measuring hearing aid satisfaction provides an outcome measure that encompasses "the full constellation of factors needed for a positive fitting result" (p. 307). Considering that one of the purposes of the HOP is to help individuals adjust to the use of amplification and to solve any problems that they experience as a result of wearing hearing aids, it seems reasonable to expect that their degree of satisfaction with hearing aids should be high. Brickley, Cleaver, and Bailey (1996), however, found no significant difference in satisfaction between hearing aid patients who had attended a 1-hr group hearing aid follow-up session compared to individuals who received 15-min, individualized post-fitting follow-up.

The purpose of this study was to explore the feasibility of using an objective knowledge based test as an outcome measure for group hearing aid intervention. In particular, the knowledge of hearing aid wearers who had completed a group HOP was compared to those who had purchased hearing aids but who had not attended an organized post fitting program (Non-HOP). In order to determine if patients who attended a group hearing aid orientation were more satisfied with their hearing aids than individuals who had not attended an organized post-fitting session, the Satisfaction with Amplification in Daily Life (SADL) was administered (Cox & Alexander, 1999).

METHOD

All adult patients who had participated in The University of Akron's HOP and all individuals who had purchased hearing aids from the Audiology and Speech Center of The University of Akron during the years 1999 and 2000 (Non-HOP) were identified and mailed a three-part questionnaire. The mailing consisted of nine questions concerning demographics, an Audiologic Rehabilitation Test (ART) which included questions about basic knowledge of hearing aids and communication skills needed by individuals with hearing impairments, and the SADL questionnaire (Cox & Alexander, 1999).

The ART is a 35-question test with a total of 43 possible points that was developed by the authors to assess basic understanding of hearing aids and the information that is typically included in HOP sessions. The ART, which is shown in Table 1, includes 12 fill-in the blank, 20 true-false, and 3 multiple-choice questions. Participants were provided with a stamped and self-addressed envelope to return the questionnaire and they were offered a free package of hearing aid bat-

Table I
Mean Percentage Correct on the Audiologic Rehabilitation Test (ART)

% HOP	% Non- HOP	Question
56.5	52.2	1. The type of hearing loss that I have is known as:
47.8	56.5	2. My hearing loss results from damage that has occurred in the part of my ear known as:
43.5	35.8	3. If a person has thresholds of 0 dB, their hearing is much worse than a person who has thresholds of 90 dB. (T/F)
73.9	69.6	4. The style of hearing aid that I have is known as:
86.7	65.2	5. The <i>T</i> position on a hearing aid stands for:
73.9	60.9	6. The <i>O</i> position on a hearing aid stands for:
65.2	35.8	7. The <i>M</i> position on a hearing aid stands for:
34.8	21.7	8. When you use the <i>Telephone Switch</i> on a hearing aid, you should hold the telephone over your ear. (T/F)
39.1	26.1	9. The average life of a hearing aid is ten (10) years. (T/F)
82.6	86.7	10. If your hearing aid is not working, what are two possible causes you might check?
56.5	56.5	11. What are two (2) things you could do to eliminate feedback (whistling)?
78.3	82.6	12. At night, the <i>On-Off</i> switch on a hearing aid should be turned to the Off position and the battery door should remain closed. (T/F)
82.6	82.6	13. Buying batteries in very large quantities, such as a year's supply, makes good economical sense, especially if you can get a good price. (T/F)
56.5	47.8	14. The function of hearing aid batteries can be affected by the weather. (T/F)
13.0	4.3	15. What steps would you take if someone swallowed one of your hearing aid batteries?
82.6	73.9	16. Dogs like to eat hearing aids. (T/F)
47.8	30.0	17. Infrared Assistive Listening Devices must be in a direct line of sight with the transmitter or a noise will be heard. (T/F)
73.9	65.2	18. There are alternatives to smoke detectors that emit an audible alarm, including those that flash, vibrate, or emit a pungent aroma. (T/F)
60.9	47.8	19. If you do not own a TTY then it will not be possible to communicate with a person who must use one. (T/F)
60.9	56.5	20. In order to get closed captioning on a new television, you must purchase it as an extra option. (T/F)
95.7	73.9	21. A noisy, reverberant room can easily be overcome by a hearing aid. (T/F)

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Table 1 Continued from previous page

% HOP	% Non- HOP	Question
56.5	52.5	22. A noisy, reverberant room can easily be overcome by an assistive listening device. (T/F)
82.6	69.6	23. According to the Americans with Disabilities Act (ADA), it is legal for public places to charge a fee if you borrow an assistive listening device. (T/F)
56.5	47.8	24. Public places, like movie theaters and hospitals, must make assistive listening devices available for use by individuals with hearing impairment. (T/F)
78.3	86.7	25. If you are given a choice concerning where to sit in a restaurant, it is usually better to sit at a freestanding table than in a booth. (T/F)
91.3	78.3	26. The most effective way to improve your chance of being heard by a person with a hearing impairment is to shout. (T/F)
69.6	35.8	27. It is possible, with training, to learn to lipread everything that a person says. (T/F)
95.7	60.9	28. All English speech sounds are visible when we try to lipread. (T/F)
82.6	73.9	29. Some sounds that "sound" different when we hear them look alike when we try to lipread them. (T/F)
60.9	52.2	30. If you do not understand someone when they tell you an important piece of information, what are three things you can do to get the needed information?
4.3	4.3	31. If you are at a bank talking to a teller, and you do not understand what she says to you, what are you most likely to do?
73.9	65.2	32. You have enjoyed going to the theater to see movies and plays, but experienced difficulty hearing. You hoped that the hearing aid(s) would take care of the problem. Unfortunately, you still have trouble hearing as well as you would like. Name an alternative that may solve the problem.
91.3	43.5	33. You are at a restaurant with three other people. The room is full of people having conversations, and there is a piano player going full blast nearby. You are having difficulty following the conversation of your dinner companions. What strategy, device, and/or changes could you employ to improve your situation?
26.0	4.3	34. You are about to be seated in a restaurant by the maitre d' at a table that seats four people. Which seat would you take?
35.8	13.0	35. A national self-help group dedicated to providing support for people with hearing impairments is known as:

Note. HOP = Hearing aid wearers who had completed a group Hearing Aid Orientation Program; Non-HOP = Hearing aid purchasers who had not attended an organized post fitting program.

teries to encourage their participation.

A total of 204 questionnaires were mailed. Of those, 41 were sent to individuals who had participated in the HOP, and 163 were sent to individuals who had purchased hearing aids during the last 2 years. Five were returned by the post office as undeliverable. A total of 82 were returned for a return rate of 41%. Of these, the following were eliminated from participation: respondents who had returned their hearing aids during the trial period; those who had attended some, but not all five HOP sessions; anyone who had attended HOP sessions prior to 1997, since HOP content had changed; anyone with known cognitive problems; significant others who had attended HOP sessions, but who were not hearing aid users themselves; and anyone with significant numbers of unanswered responses.

As a result, responses from 23 HOP participants were included for study. For analysis purposes, the HOP responses were compared to those received from the first 23 Non-HOP individuals who returned their questionnaires.

The HOP group consisted of 6 males and 17 females, while the Non-HOP group had 13 males and 10 females. The composition of the two groups was very similar in age with a mean of 73.6 years ($SD = 12.9$, range 26-87) for the HOP and 70.0 years ($SD = 12.3$, range 45-85) for the Non-HOP groups. As can be seen in Table 2, the two groups are essentially the same in terms of hearing loss and hearing aid usage. Likewise, education, socio-economic, and health status did not differ significantly between the groups.

RESULTS

An overall correct score was determined for each subject on the ART. With a total of 43 points possible, the mean score for the HOP group was 30.5 ($SD = 5.67$, range 19-40). The mean of the Non-HOP group was 25.3 ($SD = 7.9$, range

Table 2
Demographic Data

	HOP	Non-HOP
Gender		
Male	6	13
Female	17	10
Age		
Mean	73.6	70.0
Range	26-87	45-85
Length of hearing aid use in years	10.8	12.2
Pure tone average	40.5 dB HL	34.3 dB HL

Note. HOP = Hearing aid wearers who had completed a group Hearing Aid Orientation Program; Non-HOP = Hearing aid purchasers who had not attended an organized post fitting program.

10-38). Results of a t test revealed that the HOP group had a significantly higher average raw score on the ART compared to the Non-HOP group [$t(44) = 2.58$, $p < .006$]. These results are shown in Figure 1. The percentage correct on each of the ART questions is shown in Table 1.

Results from the SADL are shown in Figure 2. The SADL scale evaluates hearing aid satisfaction globally and on four subscales including positive effects, service and cost, negative features, and personal image. A total of seven descriptors are used and the scoring is such that the higher the score the greater the degree of satisfaction. The global scale score is computed by averaging the responses to all 15 items. There were no significant differences between the groups on any of the SADL scales. A comparison of the HOP and Non-HOP group means on the SADL are shown in Figure 2 compared to the published norms. For all subscales, the SADL scores were essentially at the instrument's mean as reported by Cox and Alexander (1999).

DISCUSSION

Results of this study suggest that individuals who participated in a five-session hearing aid orientation program had greater knowledge of basic information concerning audiologic rehabilitation compared to individuals who wore hearing aids yet had not attended a group program. When the scores obtained on the ART are expressed as percentage correct, the HOP group achieved a mean score of 72.1%

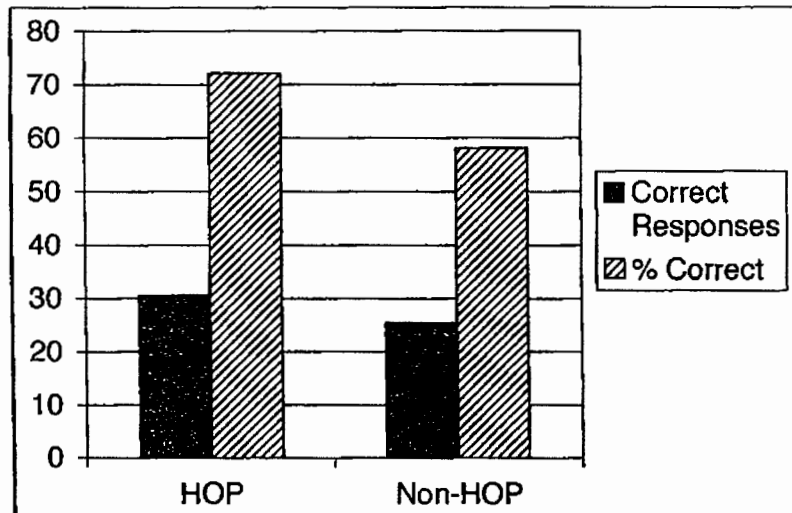


Figure 1. Audiology Rehabilitation Test results. Note. HOP = hearing aid wearers who had completed a group Hearing Aid Orientation Program; Non-HOP = hearing aid purchasers who had not attended an organized post fitting program.

compared to only 58.1% correct for the Non-HOP group.

While the average years of hearing aid use was not significantly different between the groups, only one of the Non-HOP people had worn hearing aids for less than 1 year while 5 of the HOP subjects were new, that is less than 1 year, hearing aid wearers. Considering the poor performance on the ART by individuals who were long-time hearing aid users, it appears that the information about communication strategies, assistive listening devices, the ADA, and other audiological rehabilitation information was not obtained during individual treatment sessions or learned through experience.

Of course, it is not possible to know whether the higher scores obtained by the HOP group translates into meaningful differences in their everyday life. Knowing that battery ingestion is dangerous and necessitates medical intervention does not, for example, guarantee that individuals will actually seek the appropriate assistance. On the other hand, it seems reasonable to assume that individuals who lack knowledge of the inherent hazards of battery ingestion will be less likely to get the needed help.

An objective test, such as the ART, can be used to highlight those topic areas

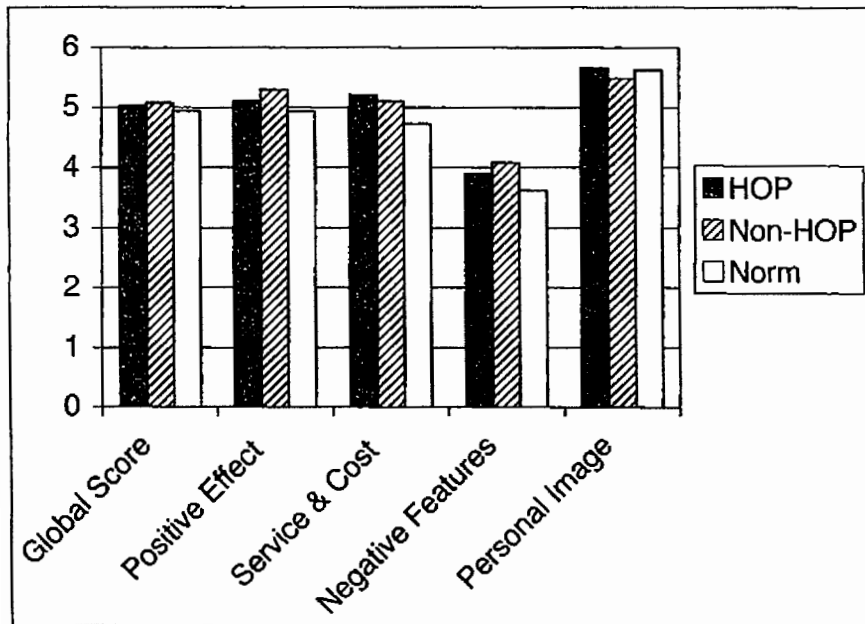


Figure 2. Satisfaction with Amplification in Daily Life (SADL) results. *Note.* HOP = hearing aid wearers who had completed a group Hearing Aid Orientation Program; Non-HOP = hearing aid purchasers who had not attended an organized post fitting program.

that are being effectively covered during hearing aid orientation programs and those that are not. For example, even though all individuals who purchase hearing aids through the Audiology and Speech Clinic are told about the Battery Ingestion Hotline, and this information is stressed during HOP, it is apparent that few individuals would know what to do if battery ingestion occurred. Only 13% of the HOP and 4.3% of Non-HOP respondents indicated that they would call the Hotline if someone swallowed one of their hearing aid batteries. Even more noteworthy, 26.1% of the Non-HOP individuals indicated that they would not seek emergency or medical help should battery ingestion occur. An objective test may also be useful in identifying individuals who score particularly poorly. These individuals may need to be targeted for more intensive intervention. They may also be people who would benefit from and need help from a significant other.

Even though the two groups differed in their basic knowledge as assessed with the ART, there was no difference in satisfaction as measured with the SADL. While this may seem to suggest that hearing aid orientation programs are not needed to guarantee satisfaction, being satisfied with amplification does not insure that individuals with hearing impairments are truly maximizing their communication potential. The HOP appears to provide individuals with hearing impairments a broader knowledge base, particularly in terms of an understanding of alternative methods of coping. As a consequence, it seems reasonable to speculate that they may be empowered to deal more effectively with the presence of their hearing loss.

Previous studies have suggested that individuals who receive an organized post-fitting hearing aid orientation tend to wear their amplification and be more satisfied with their hearing aids than individuals who do not receive such intervention (Brooks, 1979, 1985; Kapteyn, 1977; Surr et al., 1978; Ward & Gowers, 1980). The lack of a significant difference in satisfaction with amplification found between the two groups in this study may be related, in part, to the fact that subjects were fit in a university clinic. Significant amounts of time, far in excess of the typical 30 min reported by Eggen and Stanford (1988) and Kochkin (2002), are scheduled for each hearing aid patient. Follow-up visits are also readily available at no additional charge. Apparently, these services, which exceed the time and attention that might be provided in the private sector, may be adequate to insure satisfaction with amplification.

While the ART was useful as an outcome measure with the population tested, there are several limitations to its use. As Gatehouse (2000) has pointed out, an outcome measure can be useful in a particular context and for a particular purpose, but not useful in others. The ART was specifically designed to cover materials typically included in HOP programs at The University of Akron during a specific period of time. It may not be possible to generalize the use of the ART to other programs since different content and/or patient populations might be involved. In addition, as technology and treatment approaches evolve, changes in

question content are needed. However, use of an objective test appears to be a viable method for measuring program effectiveness.

Use of a mailing to distribute the test may be problematic. Although participants were clearly told that no outside sources or help from others should be secured, it was not possible to insure compliance. Future efforts should be directed to refining questions and to administering the test when appropriate monitoring can be provided. Pre- and post-intervention administration should also be investigated to determine if the ART could be useful in single-subject applications.

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